WHAT IS CLAIMED IS:

1. In a process for operating a hydrogen generator having a variable hydrogen production rate output

   i) wherein in response to a hydrogen production rate demand, externally-provided raw materials are introduced at effective feed rates into the hydrogen generator to meet the hydrogen production rate demand, said materials comprising hydrocarbon containing hydrocarbon-containing feed, oxygen-containing gas and water, and

   ii) wherein hydrogen is generated by a process comprising: reforming hydrocarbon-containing feed in the presence of steam to produce a reformate containing hydrogen, carbon monoxide and carbon dioxide, and converting carbon monoxide in the reformate to carbon dioxide by at least one of water gas shift and selective oxidation, and at least partially combusting hydrocarbon-containing feed with oxygen-containing gas to provide heat for reforming;

   the improvement comprising

   a) determining the condition of the hydrogen generator and the condition of the hydrocarbon-containing feed,

   b) electing predetermined feed rates for the externally-provided raw materials based upon the determined condition of the hydrogen generator and the condition of the hydrocarbon-containing feed, and

   c) controlling the feed rate of each of the externally-provided raw materials to substantially the selected predetermined feed rates.

2. The process of claim 1 wherein the hydrogen generator provides hydrogen to a fuel cell to generate electricity over a range of electricity production rates and the hydrogen production rate is established by the demand for hydrogen by the fuel cell.

3. The process of claim 1 wherein the predetermined rate of each of the externally-provided raw materials is defined by a bank of values specific to the hydrogen production rate for the condition of the hydrogen generator and the condition of the hydrocarbon-containing feed.

4. The process of claim 3 wherein the condition of the hydrogen generator is ascertained by monitoring operating conditions.

5. The process of claim 4 wherein cascade control based upon monitoring operating conditions establishes the bank of values of the predetermined rates specific to the hydrogen production rate.

6. The process of claim 1 wherein the predetermined rate of each of the externally-provided raw materials is established by an algorithm specific to the hydrogen production rate and the condition of the hydrogen generator and the condition of the hydrocarbon-containing feed.

7. The process of claim 6 wherein the operating condition of the hydrogen generator is ascertained by monitoring operating conditions.

8. The process of claim 7 wherein cascade control based upon monitoring operating conditions establishes the algorithm for the predetermined rates specific to the hydrogen production rate.

9. In a process for changing the rate of hydrogen production by a hydrogen generator by changing the feed rates of externally-provided raw materials into the hydrogen generator, said materials comprising fuel, oxygen-containing gas, and water, whereby fuel is reformed at elevated temperature in the presence of steam to produce a reformate containing hydrogen, carbon monoxide and carbon dioxide, and carbon monoxide contained in the reformate is converted to carbon dioxide said process having a transition rate-limiting operation, the improvement comprising controlling the rate of change of the feed rate of each of the externally-provided raw materials in accordance with a predetermined rate commensurate with the rate of change in the transition rate-limiting operation.

10. The process of claim 9 wherein the hydrogen generator provides hydrogen to a fuel cell to generate electricity over a range of electricity production rates and the hydrogen production rate is established by the electricity production rate.

11. In a process for transitioning during a transition period a hydrogen generator in which reforming a fuel is reformed in the presence of steam to produce a reformate containing hydrogen and carbon oxides including carbon monoxide and carbon monoxide in the reformate is converted to carbon dioxide to provide a hydrogen product, from a first hydrogen product rate having a first steady state operating condition including a ratio of at least one externally provided raw material to fuel, to a second hydrogen product rate having a second steady state operating condition

including the ratio of said at least one externally provided raw material to fuel, the improvement comprising providing the ratio of said at least one externally provided raw material to fuel at a value different than such ratios at the steady state condition for the first hydrogen product rate and at the steady state condition for the second hydrogen product rate for at least a portion of the transition period to enhance the transition.

12. The process of claim 11 wherein the at least one externally provided raw material comprises water for reforming.

13. The process of claim 12 wherein at least a portion of the conversion of carbon monoxide to carbon dioxide is effected by preferential oxidation in the presence of free oxygen, and the at least one externally provided raw material comprises free oxygen for the preferential oxidation.

14. The process of claim 12 wherein the ratio of said at least one externally provided raw material to fuel is sufficient and is maintained for a sufficient portion of the transition period to accommodate slower responding conditions.

15. The process of claim 12 wherein the ratio of said at least one externally provided raw material to fuel is sufficient and is maintained for a sufficient portion of the transition period to attenuate adverse transient responses.

16. A method for maintaining low levels of carbon monoxide in a hydrogen fuel processor, said method comprising adjusting a water to hydrocarbon fuel ratio and an air to hydrocarbon fuel ratio in accordance with a predetermined algorithm, wherein said fuel processor comprises a supply of said hydrocarbon fuel, and water and steam supplied to a reactor to produce hydrogen fuel comprising hydrogen and carbon monoxide, followed by the reduction in concentration of said carbon monoxide in said hydrogen fuel by passing said hydrogen fuel first to at least one water gas shift reactor and then to at least one preferential oxidation reactor, wherein said water is added to the hydrocarbon fuel prior to said hydrocarbon fuel entering said reactor, and wherein air is added to said at least one preferential oxidation reactor in accordance with said algorithm, wherein said algorithm comprises determining a target hydrocarbon fuel flow (B) and a current hydrocarbon fuel flow (A), then determining a present difference (D) = (B)-(A), and then comparing said difference (D) with a predetermined threshold value to determine whether said fuel processor is

turning up production of hydrogen, turning down production of hydrogen or operating at a steady state mode and wherein a higher ratio of water to fuel and air to fuel is added when said fuel processor is turning up production for a preset period of time than when said fuel processor is operating at a steady state mode and wherein a lower ratio of water to fuel and air to fuel is added when said fuel processor is in a turning down of production mode.

17. The method of claim 16 wherein said target hydrocarbon fuel flow and current fuel flow are measured periodically and said difference is then calculated to determine whether to increase, decrease or not change said ratios of water to fuel and air to fuel.

18. The method of claim 16 wherein upon a change from said turning up mode or said turning down mode to said steady state mode, there is a delay for a preset period of time prior to commencement of said predetermined ratio for said steady state mode.

19. The method of claim 16 wherein the fuel processor contains at least two preferential oxidation reactors, wherein an approximately equal flow of air is added to each of said preferential oxidation reactors.

20. The method of claim 16 wherein after said hydrogen fuel passes through said preferential oxidation reactors, said hydrogen fuel contains no more than 50 ppmv carbon monoxide at any time during operation of said preferential oxidation reactors.